NATIONAL GUIDELINE CLEARINGHOUSE™ (NGC)
GUIDELINE SYNTHESIS

SCREENING FOR COLORECTAL CANCER

Guidelines

1. American Cancer Society (ACS). American Cancer Society guidelines on screening and surveillance for the early detection of adenomatous polyps and cancer-update 2003. In: American Cancer Society guidelines for the early detection of cancer.CA Cancer J Clin 2003 Jan-Feb;53(1):27-43. [57 references]
2. American Gastroenterological Association, American Society for Gastrointestinal Endoscopy, American College of Physicians, American College of Gastroenterology (AGA/ASGE/ACP/ACG). Colorectal cancer screening and surveillance: clinical guidelines and rationale-update based on new evidence. Gastroenterology 2003 Feb;124(2):544-60. [102 references]
3. Canadian Task Force on Preventive Health Care (CTFPHC). Preventive health care, 2001 update: colorectal cancer screening. CMAJ 2001 Jul 24; 165(2):206-8 [20 references].
4. Updated Finnish Medical Society Duodecim (FMS). Prevention and screening of colorectal cancer. Helsinki, Finland: Duodecim Medical Publications Ltd.; 2005 Feb 23. Various p.
5. New University of Michigan Health System (UMHS). Adult preventive health care: cancer screening. Ann Arbor (MI): University of Michigan Health System; 2004 May. 12 p. [4 references]
6. U.S. Preventive Services Task Force (USPSTF). Screening for colorectal cancer: recommendations and rationale. Ann Intern Med 2002 Jul;137(2):129-31 [31 references].

TABLE OF CONTENTS:

INTRODUCTION:

A direct comparison of American Cancer Society (ACS), American Gastroenterological Association/American Society for Gastrointestinal Endoscopy/American College of Physicians/American College of Gastroenterology (AGA/ASGE/ACP/ACG), Canadian Task Force on Preventive Health Care (CTFPHC), Finnish Medical Society Duodecim (FMS), University of Michigan Health System (UMHS), and U.S. Preventive Services Task Force (USPSTF) recommendations for colorectal cancer screening, among individuals of varying risk for developing colorectal cancer, is provided in the five tables below. This synthesis purposefully excludes recommendations for symptomatic individuals and the management of positive screening results.

Table 1 presents the guidelines' scope, comparing the objectives, target population, intended users, and screening interventions discussed in each guideline. Table 2 focuses on screening recommendations for asymptomatic individuals who are at average risk for colorectal cancer. Various screening interventions are presented along with recommendations regarding frequency and administration of screening tests where applicable. Table 3 considers screening and surveillance recommendations for individuals at increased risk for colorectal cancer. Table 4 compares the potential benefits and possible harms associated with screening. Table 5 provides a comparison of the various evidence and recommendation rating schemes used by CTFPHC, FMS, UMHS and USPSTF. It also includes citations for the references supporting recommendations, where applicable.

Following the content comparison, areas of agreement and differences among the guidelines are discussed. In general, the timing of the guideline with respect to available data is an important factor to consider when evaluating areas of differences among guidelines.

Abbreviations used in the text and table:

- ACG, American College of Gastroenterology
- ACP, American College of Physicians
- ACS, American Cancer Society
- AGA, American Gastroenterological Association
- ASGE, American Society for Gastrointestinal Endoscopy
- CRC, colorectal cancer
- CTFPHC, Canadian Task Force on Preventive Health Care
- DCBE, double contrast barium enema
- DRE, digital rectal examination
- FAP, familial adenomatous polyposis
- FMS, Finnish Medical Society Duodecim
- FOBT, fecal occult blood testing

- HNPCC, hereditary nonpolyposis colorectal cancer
- TCE, total colon examination
- UMHS, University of Michigan Health System
- USPSTF, United States Preventive Services Task Force

TABLE 1: SCOPE	
	Objective
ACS (2003)	• To update the American Cancer Society guideline pertaining to colorectal cancer screening • To review emerging technologies for colorectal cancer screening • To address growing evidence concerning the benefits of early detection of colorectal cancer and adenomatous polyps • To offer recommendations to health care professionals and the public for the early detection of colorectal cancer and precancerous lesions in asymptomatic individuals
AGA / ASGE / ACP / ACG (2003)	• To incorporate updated evidence into clinical practice recommendations • To summarize new developments in the field and suggest how they should change practice
CTFPHC (2001)	To make recommendations on the effectiveness of specific screening techniques for CRC in asymptomatic patients
FMS (2005) Updated	Evidence-Based Medicine Guidelines collect, summarize, and update the core clinical knowledge essential in general practice. The guidelines also describe the scientific evidence underlying the given recommendations.
UMHS (2004) New	To implement an evidenced-based strategy for cancer screening in adults
USPSTF (2002)	• To summarize the current recommendations on screening for CRC and the supporting evidence • To update the 1996 recommendations contained in the Guide to Clinical Preventive Services, 2nd edition

Target Population	
ACS (2003)	• United States • Adults at average risk of CRC: people 50 years or older who are not otherwise defined as being at increased risk • Adults at increased risk of CRC: people with single, small (<1 cm) adenomatous polyps; people with a large (1 cm+) adenoma, multiple adenomas, or adenomas with high-grade dysplasia or villous changes; personal history of curative-intent resection of CRC; CRC or adenomatous polyps in first-degree relative younger than 60 years or in two or more first-degree relatives of any age (if not a hereditary syndrome) • Adults at high risk of CRC: people with a family history of familial adenomatous polyposis; people with a family history of hereditary non-polyposis colon cancer; people with inflammatory bowel disease, chronic ulcerative colitis, or Crohn's disease
AGA / ASGE / ACP / ACG (2003)	• People in the United States (U.S.) at average risk for CRC (asymptomatic, age $\geq$50 years, no other risk factors) • People in the U.S. at increased risk for CRC (history of adenomatous polyps or CRC; family history of colon cancer, an adenomatous polyp, familial adenomatous polyposis, or hereditary nonpolyposis CRC) Note: People with symptoms or signs that suggest the presence of CRC or polyps fall outside the domain of screening and should be offered an appropriate diagnostic evaluation (see Table 2 in the original guideline document).
CTFPHC (2001)	• Canada • Average risk and above-average risk asymptomatic people with no personal history of ulcerative colitis, polyps, or CRC Note: Above average risk individuals are those at risk for familial adenomatous polyposis, hereditary non-polyposis colon cancer, and those with a family history of polyps or colon cancer.
FMS (2005) Updated	• Finland • Asymptomatic persons with increased risk for colorectal cancer • General population

UMHS (2004) New	• United States • Adults, 18 years and older
USPSTF (2002)	• United States • Men and women 50 years of age or older
Intended Users	
ACS (2003)	Advanced Practice Nurses Allied Health Personnel Health Care Providers Health Plans Hospitals Managed Care Organizations Nurses Patients Physician Assistants Physicians Public Health Departments
AGA / ASGE / ACP / ACG (2003)	Physicians
CTFPHC (2001)	Advanced Practice Nurses Allied Health Personnel Nurses Physician Assistants Physicians Students
FMS (2005) Updated	Health Care Providers Physicians
UMHS (2004) New	Physicians
USPSTF (2002)	Advanced Practice Nurses Allied Health Personnel Health Care Providers Nurses Physician Assistants Physicians
Screening Interventions Considered	
ACS	1. Fecal occult blood testing (FOBT), guaiac-based

(2003)	and immunochemical technologies (e.g., !nSure™ immunochemical test) 2. Digital rectal examination (DRE) at time of sigmoidoscopy or colonoscopy 3. Flexible sigmoidoscopy 4. Total colon examination (TCE) by colonoscopy or double-contrast barium enema (DCBE)
AGA / ASGE / ACP / ACG (2003)	1. FOBT, guaiac-based and immunochemical technologies 2. Sigmoidoscopy 3. Combined FOBT and sigmoidoscopy 4. Colonoscopy 5. DCBE
CTFPHC (2001)	1. FOBT [guaiac-based], flexible sigmoidoscope, or both as a part of multiphase screening 2. Colonoscopy as a part of uniphase screening 3. Genetic testing Screening with digital rectal examination and double contrast barium enema were not considered because of the lack of direct evidence.
FMS (2005) Updated	1. FOBT, guaiac-based 2. Colonoscopy
UMHS (2004) New	1. FOBT 2. Flexible sigmoidoscopy 3. Colonoscopy Screening options considered but not recommended: 1. Air or double-contrast barium enema 2. DRE 3. Stool deoxyribonucleic acid (DNA) test 4. Virtual colonoscopy Note: This guideline also addresses interventions regarding breast cancer screening, prostate cancer screening and cervical cancer screening.
USPSTF (2002)	1. Home FOBT 2. Flexible sigmoidoscopy 3. The combination of home FOBT and flexible sigmoidoscopy 4. Colonoscopy

	5. DCBE Screening options considered but not recommended: 1. DRE 2. Computed tomography colography

TABLE 2: COMPARISON OF RECOMMENDATIONS FOR SCREENING FOR COLORECTAL CANCER: ADULTS, ≥50 YEARS, NO OTHER RISK FACTORS	
Choosing a Screening Test	
ACS (2003)	No recommendations offered.
AGA/ASGE/ACP/ACG (2003)	Men and women at average risk should be offered screening for colorectal cancer and adenomatous polyps beginning at age 50 years. They should be offered options for screening, with information about the advantages and disadvantages associated with each approach, and should be given an opportunity to apply their own preferences in selecting how they should be screened.
CTFPHC (2001)	No recommendations offered.
FMS (2005) Updated	No recommendations offered.
UMHS (2004) New	Recommended methods include: FOBT, flexible sigmoidoscopy, or colonoscopy. (DRE is not effective in screening for colorectal cancer.) Individualizing screening to offer the highest likelihood of compliance and the least intrusive option to the patient may be warranted. In addition to patient preference, other factors, such as age, comorbidities, and test availability may influence the choice of screening modality.
USPSTF (2002)	Potential screening options for colorectal cancer include home fecal occult blood testing, flexible sigmoidoscopy, the combination of home fecal occult blood testing and

	flexible sigmoidoscopy, colonoscopy, and double-contrast barium enema. Each option has advantages and disadvantages that may vary for individual patients and practice settings. The choice of specific screening strategy should be based on patient preferences, medical contraindications, patient adherence, and available resources for testing and follow-up. Clinicians should talk to patients about the benefits and potential harms associated with each option before selecting a screening strategy.
Fecal Occult Blood Testing (FOBT)	
ACS (2003)	• FOBT annually is an acceptable screening option. • The recommended take-home multiple sample method should be used. • FOBT as it is sometimes done in physician's offices, with the single stool sample collected on the fingertip during a digital rectal examination, is not an adequate substitute for the recommended at-home procedure of collecting two samples from three consecutive specimens. Toilet bowl FOBT tests also are not recommended. In comparison with guaiac-based tests for the detection of occult blood, immunochemical tests are more patient-friendly and are likely to be equal or better in sensitivity and specificity.
AGA / ASGE / ACP / ACG (2003)	• Offer yearly screening with FOBT using a guaiac-based test with dietary restriction or an immunochemical test without dietary restriction. • Two samples from each of 3 consecutive stools should be examined without rehydration.
CTFPHC (2001)	• There is good evidence to include screening with Hemoccult test in the periodic health examination of asymptomatic patients over age 50 with no other risk factors [A, I]. • For patients being screened with Hemoccult, it is recommended that they avoid red meat, cantaloupe and melons, raw turnip, radishes, broccoli and cauliflower, vitamin C supplements, and aspirin and non-steroidal anti-inflammatory drugs for 3 days before fecal samples are collected. However, a recent meta-analysis of 4 randomized controlled trials found no improvement in positivity rates or change in compliance rates with moderate

	dietary restrictions.
FMS (2005) Updated	The results of large trials involving screening for faecal occult blood indicate a reduction in mortality from colorectal cancer (Towler et al., 2002) [A], but such screening results in colonoscopy being performed on a large proportion of the screened population. The cost-effectiveness of screening is controversial. Only about 50% of those invited can be expected to attend screening (Vernon, 1997; DARE, 1999) [B].
UMHS (2004) New	Initiate: For average risk, asymptomatic patients, screening should begin at age 50. Average risk. FOBT: annually [A]
USPSTF (2002)	• The USPSTF strongly recommends that clinicians screen men and women 50 years of age or older for colorectal cancer. Grade A recommendation. • The USPSTF found fair to good evidence that several screening methods are effective in reducing mortality from colorectal cancer. The USPSTF concluded that the benefits from screening substantially outweigh potential harms, but the quality of evidence, magnitude of benefit, and potential harms vary with each method. • There is good evidence that periodic FOBT reduces mortality from CRC. • Annual FOBT offers greater reductions in mortality rates than biennial screening but produces more false-positive results. • Proven methods of FOBT screening use guaiac-based test cards prepared at home by patients from three consecutive stool samples and forwarded to the clinician. Whether patients need to restrict their diet and avoid certain medications is not established. Rehydration of the specimens before testing increases the sensitivity of fecal occult blood testing but substantially increases the number of false-positive test results.
Flexible Sigmoidoscopy	
ACS (2003)	• Flexible sigmoidoscopy performed every 5 years is an acceptable screening option. • All positive tests should be followed up with colonoscopy.

AGA / ASGE / ACP / ACG (2003)	Offer flexible sigmoidoscopy every 5 years.
CTFPHC (2001)	There is evidence from case control studies to recommend that flexible sigmoidoscopy be included in the periodic health examination of patients over age 50 [B, II-2, III].
FMS (2005) Updated	No recommendations offered.
UMHS (2004) New	Initiate: For average risk, asymptomatic patients, screening should begin at age 50. Average risk. Flexible sigmoidoscopy: every 5 years [A]
USPSTF (2002)	• The USPSTF strongly recommends that clinicians screen men and women 50 years of age or older for colorectal cancer. Grade A recommendation. • The USPSTF found fair to good evidence that several screening methods are effective in reducing mortality from colorectal cancer. The USPSTF concluded that the benefits from screening substantially outweigh potential harms, but the quality of evidence, magnitude of benefit, and potential harms vary with each method. • There is fair evidence that sigmoidoscopy alone or in combination with FOBT reduces mortality. • 5-year intervals have been recommended for flexible sigmoidoscopy; there is no direct evidence with which to determine the optimal interval. Case-control studies have suggested that sigmoidoscopy every 10 years may be as effective as sigmoidoscopy performed at shorter intervals.
Combined Fecal Occult Blood Testing and Flexible Sigmoidoscopy	
ACS (2003)	FOBT every year plus flexible sigmoidoscopy every 5 years is an acceptable screening option. Flexible sigmoidoscopy together with FOBT is preferred compared with FOBT or flexible sigmoidoscopy alone. All positive tests should be followed up with colonoscopy.
AGA / ASGE / ACP / ACG (2003)	Offer screening with FOBT every year combined with flexible sigmoidoscopy every 5 years. When both tests

	are performed, the FOBT should be done first.
CTFPHC (2001)	There is insufficient evidence to make recommendations about whether only 1 or both of FOBT and sigmoidoscopy should be performed [C, I].
FMS (2005) Updated	No recommendations offered.
UMHS (2004) New	Initiate: For average risk, asymptomatic patients, screening should begin at age 50. Average risk: FOBT/flexible sigmoidoscopy: annually/every 5 years [B]
USPSTF (2002)	• The USPSTF strongly recommends that clinicians screen men and women 50 years of age or older for colorectal cancer. Grade A recommendation. • The USPSTF found fair to good evidence that several screening methods are effective in reducing mortality from colorectal cancer. The USPSTF concluded that the benefits from screening substantially outweigh potential harms, but the quality of evidence, magnitude of benefit, and potential harms vary with each method. • There is fair evidence that sigmoidoscopy alone or in combination with FOBT reduces mortality. • The combination of fecal occult blood testing and sigmoidoscopy may detect more cancers and more large polyps than either test alone, but the additional benefits and potential harms of combining the two tests are uncertain. In general, the FOBT should precede sigmoidoscopy because a positive test result is an indication for colonoscopy, obviating the need for sigmoidoscopy.
Digital Rectal Examination (DRE)	
ACS (2003)	Screening with DRE was not considered.
AGA / ASGE / ACP / ACG (2003)	Screening with DRE was not considered.
CTFPHC (2001)	Screening with digital rectal examination was not considered because of the lack of direct evidence.
FMS	Screening with DRE was not considered.

(2005) Updated	
UMHS (2004) New	DRE is not effective in screening for colorectal cancer.
USPSTF (2002)	• The USPSTF strongly recommends that clinicians screen men and women 50 years of age or older for colorectal cancer. Grade A recommendation. • The USPSTF found fair to good evidence that several screening methods are effective in reducing mortality from colorectal cancer. The USPSTF concluded that the benefits from screening substantially outweigh potential harms, but the quality of evidence, magnitude of benefit, and potential harms vary with each method. • Neither DRE nor the testing of a single stool specimen obtained during digital rectal examination is recommended as an adequate screening strategy for colorectal cancer.
Barium Enema	
ACS (2003)	• Double contrast barium enema (DCBE) every 5 years is an acceptable screening option. • All positive tests should be followed up with colonoscopy.
AGA / ASGE / ACP / ACG (2003)	Offer DCBE every 5 years.
CTFPHC (2001)	Screening with double contrast barium enema was not considered because of the lack of direct evidence.
FMS (2005) Updated	No recommendations offered.
UMHS (2004) New	Initiate: For average risk, asymptomatic patients, screening should begin at age 50. Average risk: Air or double-contrast barium enema (acceptable modality but not recommended): every 5 years [B].
USPSTF (2002)	• The USPSTF strongly recommends that clinicians screen men and women 50 years of age or older

	for colorectal cancer. Grade A recommendation. • The USPSTF found fair to good evidence that several screening methods are effective in reducing mortality from colorectal cancer. The USPSTF concluded that the benefits from screening substantially outweigh potential harms, but the quality of evidence, magnitude of benefit, and potential harms vary with each method. • DCBE offers an alternative means of whole-bowel examination, but it is less sensitive than colonoscopy, and there is no direct evidence that it is effective in reducing mortality rates. • Five year intervals have been recommended for DCBE screening but there is no direct evidence with which to determine the optimal interval.
Colonoscopy	
ACS (2003)	• Colonoscopy every 10 years is an acceptable screening option. • If colonoscopy is unavailable, not feasible, or not desired by the patient, double contrast barium enema alone, or the combination of flexible sigmoidoscopy and double contrast barium enema are acceptable alternatives. Adding flexible sigmoidoscopy to DCBE may provide a more comprehensive diagnostic evaluation than double contrast barium enema alone in finding significant lesions. A supplementary double contrast barium enema may be needed if a colonoscopic exam fails to reach the cecum, and a supplementary colonoscopy may be needed if a double contrast barium enema identifies a possible lesion or does not adequately visualize the entire colorectum.
AGA / ASGE / ACP / ACG (2003)	Offer colonoscopy every 10 years.
CTFPHC (2001)	There is insufficient evidence to include or exclude colonoscopy as an initial screen in the periodic health examination [C, II-3]. Although colonoscopy is the best method for detecting adenomas and carcinomas, it may not be feasible to screen asymptomatic patients because of patient compliance and the expertise and equipment required and the potential costs. On the other hand, if colonoscopy were an effective screening strategy when

	performed at less frequent intervals, these issues might be of less concern.
FMS (2005) Updated	The use of colonoscopy for screening of asymptomatic individuals is indicated only in cases with marked familial susceptibility to cancer, or if an adenoma has earlier been removed endoscopically.
UMHS (2004) New	Initiate: For average risk, asymptomatic patients, screening should begin at age 50. Average risk: Colonoscopy: every 10 years [B].
USPSTF (2002)	• The USPSTF strongly recommends that clinicians screen men and women 50 years of age or older for colorectal cancer. Grade A recommendation. • The USPSTF found fair to good evidence that several screening methods are effective in reducing mortality from colorectal cancer. The USPSTF concluded that the benefits from screening substantially outweigh potential harms, but the quality of evidence, magnitude of benefit, and potential harms vary with each method. • The USPSTF did not find direct evidence that screening colonoscopy is effective in reducing CRC mortality; efficacy of colonoscopy is supported by its integral role in trials of fecal occult blood testing, extrapolation from sigmoidoscopy studies, limited case-control evidence, and the ability of colonoscopy to inspect the proximal colon. • It is unclear whether the increased accuracy of colonoscopy compared with alternative screening methods (for example, the identification of lesions that FOBT and flexible sigmoidoscopy would not detect) offsets the procedure's additional complications, inconvenience, and costs. • A 10-year interval has been recommended for colonoscopy on the basis of evidence regarding the natural history of adenomatous polyps.

TABLE 3: COMPARISON OF RECOMMENDATIONS FOR SCREENING FOR COLORECTAL CANCER: PEOPLE AT INCREASED RISK FOR COLORECTAL CANCER
People with Family History of Colorectal Cancer

ACS (2003)	People with a family history of either CRC or colorectal adenomas that occurred in a first-degree relative before age 60, or in multiple first-degree relatives of any age (if not a hereditary syndrome), should have a colonoscopy* at age 40, or 10 years before the youngest case in the immediate family. Examination should be repeated every 5 to 10 years. CRC in relatives more distant than first-degree does not increase risk substantially above the average risk group. *Note: If a colonoscopy is not available, not feasible, or not desired by the patient, a DCBE or flexible sigmoidoscopy followed by a DCBE can be used.
AGA / ASGE / ACP / ACG (2003)	People with a first-degree relative (parent, sibling, or child) with colon cancer or adenomatous polyps diagnosed at age <60 years or 2 first-degree relatives diagnosed with colorectal cancer at any age should be advised to have screening colonoscopy starting at age 40 years or 10 years younger than the earliest diagnosis in their family, whichever comes first, and repeated every 5 years (see Table 3 in the original guideline document). People with a first-degree relative with colon cancer or adenomatous polyp diagnosed at age ≥60 years or 2 second-degree relatives with colorectal cancer should be advised to be screened as average risk persons, but beginning at age 40 years. People with 1 second-degree relative (grandparent, aunt, or uncle) or third-degree relative (great-grandparent or cousin) with colorectal cancer should be advised to be screened as average risk persons.
CTFPHC (2001)	Patients who have only one or two first-degree relatives with CRC should be screened in the same way as average risk individuals. There is insufficient evidence to recommend colonoscopy for individuals who have a family history of colorectal polyps or cancer but do not fit the criteria for hereditary non-polyposis colon cancer [C, III]. While there is evidence that there is an increased prevalence of neoplasms in these individuals, there is insufficient information to recommend more intense screening than that of individuals at average risk. Further delineation of the risk for individuals with multiple affected family members and family members with early age of diagnosis of CRC is necessary.
FMS	The use of colonoscopy for screening of asymptomatic

(2005) Updated	individuals is indicated only in cases with marked familial susceptibility to cancer, or if an adenoma has earlier been removed endoscopically.
UMHS (2004) New	• Persons who have one second-degree (includes grandparents, aunts, and uncles) or any third-degree relative (includes great-grandparents and cousins) with colorectal cancer should be screened in the same way as average risk individuals.* • Persons who have a first degree relative (includes parents, siblings, and children) affected with colorectal cancer or adenomatous polyp at age ≥60 years, or 2 second-degree relatives affected with colorectal cancer should be screened in the same way as average risk individuals, but starting at age 40 years.* • Persons who have two or more first-degree relatives with colon cancer, or a single first-degree relative with colon cancer or adenomatous polyps diagnosed at an age <60 years should be screened with a colonoscopy every 5 years, beginning at age 40 years or 10 years younger than the earliest diagnosis in the family, whichever comes first.* *From the American Gastroenterological Association, American Society for Gastrointestinal Endoscopy, American College of Physicians, American College of Gastroenterology (AGA/ASGE/ACP/ACG). Colorectal cancer screening and surveillance: clinical guidelines and rationale-update based on new evidence. Gastroenterology 2003 Feb;124(2):544-60.
USPSTF (2002)	In persons at higher risk (for example, those with a first-degree relative who receives a diagnosis with CRC before 60 years of age), initiating screening at an earlier age is reasonable.
People with a Family History of Familial Adenomatous Polyposis	
ACS (2003)	Individuals with a family history of familial adenomatous polyposis are at high risk and should undergo early surveillance with endoscopy, and counseling to consider genetic testing beginning at puberty. If the genetic test is positive, colectomy is indicated; these patients are best referred to a center with experience in the management of familial adenomatous polyposis.
AGA / ASGE / ACP / ACG (2003)	People who have a genetic diagnosis of familial adenomatous polyposis (FAP), or are at risk of having FAP but genetic testing has not been performed or is not feasible, should have annual sigmoidoscopy, beginning at age 10-12 years, to determine if they are

	expressing the genetic abnormality. Genetic testing should be considered in patients with FAP who have relatives at risk. Genetic counseling should guide genetic testing and considerations of colectomy.
CTFPHC (2001)	The Task Force recommends genetic testing of individuals at risk for familial adenomatous polyposis if the genetic mutation has been identified in the family and if genetic testing is available [B, II-3]. If the individual carries the mutation, then he or she should be screened with flexible sigmoidoscopy beginning at puberty [B, II-3]. Individuals from families where the gene mutation has been identified but are negative themselves, require screening similar to the average risk population. For at risk individuals where the mutation has not been identified in the family or where genetic testing is not available, screening with annual or biannual flexible sigmoidoscopy should be undertaken beginning at puberty. In all instances, genetic counseling should be performed prior to genetic testing.
FMS (2005) Updated	The use of colonoscopy for screening of asymptomatic individuals is indicated only in cases with marked familial susceptibility to cancer or if an adenoma has earlier been removed endoscopically.
UMHS (2004) New	• Persons who have a first degree relative (includes parents, siblings, and children) affected with colon cancer or adenomatous polyps at age $\geq$60 years should be screened in the same way as average risk individuals, but starting at age 40 years.* • Persons who have two or more first-degree relatives with colon cancer, or a single first-degree relative with colon cancer or adenomatous polyps diagnosed at an age <60 years should be screened with a colonoscopy every 5 years, beginning at age 40 years or 10 years younger than the earliest diagnosis in the family, whichever comes first* • Persons who are gene carriers or at risk for familial adenomatous polyposis (includes the subcategories of familial adenomatous polyposis, Gardner syndrome, some Turcot syndrome families, and attenuated adenomatous polyposis coli [AAPC]) should be screened with a sigmoidoscopy annually, beginning at age 10 to 12 years. (For patients with APPC, colonoscopy should be used instead of sigmoidoscopy because of the preponderance of proximal colonic adenomas. Colonoscopy screening in AAPC should probably begin in the late teens or

	early 20s.)* *From the American Gastroenterological Association, American Society for Gastrointestinal Endoscopy, American College of Physicians, American College of Gastroenterology (AGA/ASGE/ACP/ACG). Colorectal cancer screening and surveillance: clinical guidelines and rationale-update based on new evidence. Gastroenterology 2003 Feb;124(2):544-60.
USPSTF (2002)	Expert guidelines exist for screening very high-risk patients, including those with a history suggestive of familial polyposis or hereditary nonpolyposis CRC or those with a personal history of ulcerative colitis. Early screening with colonoscopy may be appropriate, and genetic counseling or testing may be indicated for patients with genetic syndromes.
People with a Family History of Hereditary Nonpolyposis Colorectal Cancer (HNPCC)	
ACS (2003)	Individuals with a family history of HNPCC should undergo colonoscopy and counseling to consider genetic testing beginning at age 21. If the genetic test is positive or if patient has not had genetic testing, colonoscopy is recommended every 1 to 2 years until age 40 years, then annually. These patients are best referred to a center with experience in the management of HNPCC.
AGA / ASGE / ACP / ACG (2003)	People with a genetic or clinical diagnosis of HNPCC or who are at increased risk for HNPCC should have colonoscopy every 1 to 2 years beginning at age 20 to 25 years, or 10 years earlier than the youngest age of colon cancer diagnosis in the family--whichever comes first. Genetic testing for HNPCC should be offered to first-degree relatives of persons with a known inherited mismatch repair (MMR) gene mutation. It should also be offered when the family mutation is not already known, but 1 of the first 3 of the modified Bethesda Criteria is met (see Table 5 in the original guideline document).
CTFPHC (2001)	Patients in kindreds with the cancer family syndrome (HNPCC) have a high risk of CRC and a high incidence of right-sided colon cancer. Thus, colonoscopy rather than sigmoidoscopy is recommended for screening such patients. Based on Level III evidence, the Task Force recommends screening with colonoscopy in individuals from hereditary non-polyposis colon cancer kindreds [B, II-3]. Although higher levels of evidence are usually required to give a B recommendation, the Task Force realizes that it is unlikely that more rigorous

	studies could be performed in this cohort of patients given the high risk of cancer and relative infrequency of hereditary non-polyposis colon cancer. The ages when screening should begin and the frequency at which colonoscopy should be performed are unclear.
FMS (2005) Updated	The use of colonoscopy for screening of asymptomatic individuals is indicated only in cases with marked familial susceptibility to cancer or if an adenoma has earlier been removed endoscopically.
UMHS (2004) New	Persons who are gene carriers or pancolitis at risk for HNPCC should be screened with a colonoscopy every 1 to 2 years, beginning at age 20 to 25 years or 10 years younger than the earliest case in the family, whichever comes first.* *From the American Gastroenterological Association, American Society for Gastrointestinal Endoscopy, American College of Physicians, American College of Gastroenterology (AGA/ASGE/ACP/ACG). Colorectal cancer screening and surveillance: clinical guidelines and rationale-update based on new evidence. Gastroenterology 2003 Feb;124(2):544-60.
USPSTF (2002)	Expert guidelines exist for screening very high-risk patients, including those with a history suggestive of familial polyposis or hereditary nonpolyposis CRC or those with a personal history of ulcerative colitis. Early screening with colonoscopy may be appropriate, and genetic counseling or testing may be indicated for patients with genetic syndromes.
People with a History of Adenomatous Polyps	
ACS (2003)	People who have been diagnosed as having adenomatous polyps should have a colonoscopy to remove all polyps from the colorectum, after which a colonoscopic exam should be repeated at an interval to be determined on the basis of the size, multiplicity, and histologic appearance of the adenoma(s). • People with single, small (<1 cm) adenoma should be screened with colonoscopy* 3 to 6 years after the initial polypectomy. If the exam is normal, the patient can thereafter be screened as per average risk guidelines (see above). • People with a large (1 cm+) adenoma, multiple adenomas, or adenomas with high-grade dysplasia or villous change should be screened with colonoscopy* within 3 years after the initial polypectomy. If normal, repeat examination in 3 years; if normal then, the patient can thereafter be

	screened as per average risk guidelines (see above). *Note: If a colonoscopy is not available, not feasible, or not desired by the patient, a DCBE, or flexible sigmoidoscopy followed by a DCBE can be used.
AGA / ASGE / ACP / ACG (2003)	Patients who have had 1 or more adenomatous polyps removed at colonoscopy should be managed according to the findings on that colonoscopy. Patients who have had numerous adenomas, a malignant adenoma (with invasive cancer), a large sessile adenoma, or an incomplete colonoscopy should have a short interval follow-up colonoscopy based on clinical judgment. Patients who have advanced or multiple adenomas ($\geq$3) should have their first follow-up colonoscopy in 3 years. Patients who have 1 or 2 small (<1 cm) tubular adenomas should have their first follow-up colonoscopy at 5 years. It is not unreasonable, given available evidence, to choose even longer intervals. However, the evidence is still evolving. Future evidence may clarify the intervals more precisely. The timing of the subsequent colonoscopy should depend on the pathology and number of adenomas detected at follow-up colonoscopy. For example, if the first follow-up colonoscopy is normal or only 1 or 2 small (<1 cm) tubular adenomas are found, the next colonoscopy can be in 5 years.
CTFPHC (2001)	People with a history of adenomatous polyps are beyond the scope of the guideline.
FMS (2005) Updated	• The use of colonoscopy for screening of asymptomatic individuals is indicated if an adenoma has earlier been removed endoscopically. • Follow-up after the initial investigations is not indicated in persons with a single small tubular adenoma in the rectum, or in patients above 75 years of age. • Individuals with a history of one large adenoma or several adenomas of any type should undergo screening colonoscopy at 3- to 5-year intervals.
UMHS (2004) New	Persons who have a history of adenomatous polyps, for example: • 1 or 2 small (<1 cm) tubular adenomas • Advanced or multiple adenomas ($\geq$3)

	Manage according to the findings and clinical judgment, for example: • First follow-up colonoscopy at 5 years • First follow-up colonoscopy in 3 years. Timing of subsequent colonoscopy depends on findings at follow-up.* *From the American Gastroenterological Association, American Society for Gastrointestinal Endoscopy, American College of Physicians, American College of Gastroenterology (AGA/ASGE/ACP/ACG). Colorectal cancer screening and surveillance: clinical guidelines and rationale-update based on new evidence. Gastroenterology 2003 Feb;124(2):544-60.
USPSTF (2002)	Expert guidelines exist for screening very high-risk patients, including those with a history suggestive of familial polyposis or hereditary nonpolyposis CRC, or those with a personal history of ulcerative colitis. Early screening with colonoscopy may be appropriate, and genetic counseling or testing may be indicated for patients with genetic syndromes.
People with a History of Colorectal Cancer	
ACS (2003)	Individuals with a personal history of curative-intent resection of CRC are at increased risk. Colonoscopy* is recommended within 1 year after resection. If normal, repeat examination in 3 years; if normal then, repeat examination every 5 years. *Note: If a colonoscopy is not available, not feasible, or not desired by the patient, a DCBE, or flexible sigmoidoscopy followed by a DCBE can be used.
AGA / ASGE / ACP / ACG (2003)	Patients with a colon cancer that has been resected with curative intent should have a colonoscopy around the time of initial diagnosis to rule out synchronous neoplasms. If the colon is obstructed preoperatively, colonoscopy can be performed approximately 6 months after surgery. If this or a complete preoperative examination is normal, subsequent colonoscopy should be offered after 3 years, and then, if normal, every 5 years.
CTFPHC (2001)	People with a history of CRC are beyond the scope of the guideline.
FMS (2005) Updated	No recommendations offered.

UMHS (2004) New	History of CRC: After colonoscopy to rule out synchronous neoplasms and resection with curative intent, first follow-up colonoscopy after 3 years, and then, if normal, every 5 years. *From the American Gastroenterological Association, American Society for Gastrointestinal Endoscopy, American College of Physicians, American College of Gastroenterology (AGA/ASGE/ACP/ACG). Colorectal cancer screening and surveillance: clinical guidelines and rationale-update based on new evidence. Gastroenterology 2003 Feb;124(2):544-60.
USPSTF (2002)	People with a history of CRC are beyond the scope of this guideline.
People with Inflammatory Bowel Disease	
ACS (2003)	Individuals with inflammatory bowel disease, chronic ulcerative colitis, or Crohn's disease are at high risk. Colonoscopies with biopsies for dysplasia are recommended 8 years after the start of pancolitis; 12 to 15 years after the start of left-sided colitis. Examination should be repeated every 1 to 2 years. These patients are best referred to a center with experience in the surveillance and management of inflammatory bowel disease.
AGA / ASGE / ACP / ACG (2003)	In patients with long-standing, extensive inflammatory bowel disease, surveillance colonoscopy with systematic biopsies should be considered. This applies to both ulcerative colitis and Crohn's colitis because the cancer risk is similar in both diseases.
CTFPHC (2001)	People with inflammatory bowel disease are beyond the scope of the guideline.
FMS (2005) Updated	No recommendations offered.
UMHS (2004) New	Inflammatory bowel disease (ulcerative colitis, Crohn's colitis): In patients with long-standing, extensive inflammatory bowel disease (ulcerative colitis, Crohn's colitis), surveillance colonoscopy with systematic biopsies should be considered.* *From the American Gastroenterological Association, American Society for Gastrointestinal Endoscopy, American College of Physicians, American College of Gastroenterology (AGA/ASGE/ACP/ACG). Colorectal cancer screening and surveillance: clinical guidelines and rationale-update based on new evidence. Gastroenterology 2003 Feb;124(2):544-60.

USPSTF (2002)	Expert guidelines exist for screening very high-risk patients, including those with a history suggestive of familial polyposis or hereditary nonpolyposis CRC, or those with a personal history of ulcerative colitis. Early screening with colonoscopy may be appropriate, and genetic counseling or testing may be indicated for patients with genetic syndromes.

TABLE 4: BENEFITS/HARMS OF SCREENING	
Benefits of Screening	
ACS (2003)	Decreased colorectal cancer mortality due to early detection Colorectal cancer is a type of cancer for which screening is particularly effective. Screening can detect adenomatous polyps, precursors to cancer that can be successfully removed thereby preventing the cancer from occurring. Screening can also detect early stage colorectal cancer when it is very amenable to treatment, as evidenced by the fact that 90 percent of patients diagnosed with localized disease are alive five years after diagnosis. Advantages of !nSure™ Fecal Occult Blood Test (FOBT) Advantages of an immunochemical FOBT compared with a guaiac test include: • Improved specificity. Immunochemical tests will not react with non-human hemoglobin, vitamins, drugs, or peroxidase from food sources. !nSure™ FOBT has also been shown to be non-reactive with blood from the upper gastrointestinal tract when bleeding is occult. • Potential increase in patient compliance. Since no dietary restrictions are needed, and since !nSure™ requires collection from only two stool specimens and is performed by swirling a brush in the toilet water with the stool, it may be more acceptable to the consumer than current FOBT tests with their higher testing and stool handling requirements.
AGA/ASGE/ACP/ACG (2003)	• Increased rates of appropriate and timely colorectal cancer screening based on patient and physician collaboration • Improved physician and patient understanding of

	the rationale and evidence supporting colorectal cancer screening options (refer to the rationale section in the original guideline document for the relative effectiveness of each screening test) • Reduced morbidity and mortality due to colorectal cancer • Reduced health care costs
CTFPHC (2001)	• Hemoccult testing: There is evidence from randomized controlled trials that fecal occult blood testing results in a significant decrease in mortality from CRC, but not in overall mortality. The relative risk reduction is approximately 15% and in absolute terms, approximately 8.5 deaths from CRC would be averted if 10,000 people were screened over 10 years. The sensitivity of the test was approximately 50% in 3 of the trials and concern remains about the sensitivity of Hemoccult testing and the potential for false reassurance. The psychological issues of screening and the acceptability of screening on a community basis have not been studied. Compliance rates have varied for both initial testing and follow-up investigations. • Sigmoidoscopy: There is evidence from case control studies that sigmoidoscopy may reduce the risk of death from CRC. Randomized controlled trial evidence suggests that flexible sigmoidoscopy may be superior in detecting adenomas and possibly cancer than fecal occult blood testing. However, the trials are small and do not report mortality data. Therefore, the benefit of flexible sigmoidoscopy alone compared with fecal occult blood test or in combination with fecal occult blood test cannot be ascertained. However, there is fair evidence to suggest that sigmoidoscopy may reduce mortality from CRC. Flexible sigmoidoscopy may be preferable to rigid sigmoidoscopy, because the physician can examine the more proximal colon with the flexible sigmoidoscope than with the rigid one and thus detect more adenomas and carcinomas. The flexible sigmoidoscope may be more acceptable to patients and safer. Bowel perforations occur at a rate of 1.4 per 10,000 flexible sigmoidoscopic examinations of asymptomatic patients. It does require a more qualified examiner than rigid sigmoidoscopy. • Colonoscopy: There is no direct evidence about the effectiveness of colonoscopy as a screening maneuver in asymptomatic, average risk

	individuals. Perforation rates are higher with colonoscopy than sigmoidoscopy (approximately 10 per 10,000 procedures). Since approximately 45% of cancers are right sided in hereditary nonpolyposis CRC families, colonoscopy is the preferred method of screening.
FMS (2005) Updated	Screening may help detect colorectal cancer and reduce the incidence of or mortality from colorectal cancer.
UMHS (2004) New	Early detection and treatment may avert future cancer-related illness.
USPSTF (2002) New	• Fecal Occult Blood Testing (FOBT). There is good evidence that periodic FOBT reduces mortality from CRC. Annual FOBT offers greater reductions in mortality rates than biennial screening but produces more false-positive results. Three randomized controlled trials (RCTs), all using the Hemoccult® test kit, show reductions in risk of death from colorectal cancer from 15% to 33% from periodic fecal occult blood test screening. Two European trials, which randomized patients prior to agreement to participate and used biennial screening and unrehydrated test cards, found 15% to 18% reductions in mortality. In a U.S. study, which randomized volunteers and used rehydrated test cards, colorectal cancer mortality after 18 years of follow-up was 33% lower among persons advised to undergo annual fecal occult blood test than among controls who received usual care (9.46 versus 14.09 deaths per 1,000 patients screened); biennial screening reduced mortality by 21%. A fourth trial conducted in Sweden has not reported final mortality results, but no significant mortality reduction was reported after 2 rounds of rehydrated testing (relative risk [RR], 0.88; 95% confidence interval [CI], 0.69 - 1.12). • Sigmoidoscopy. Current evidence of the effectiveness of sigmoidoscopy is limited to several well-designed case-control studies, but 2 ongoing randomized controlled trials of screening with flexible sigmoidoscopy are expected to report results within 5 years. A case-control study in a large health plan that had implemented rigid sigmoidoscopy screening suggested that screening reduced the risk of death from cancers within reach of the rigid sigmoidoscope by 59%. A second case-

	control study in which 75% of the examinations were performed with a flexible instrument found similar protection. • Fecal Occult Blood Testing and Sigmoidoscopy. No randomized controlled trials have examined whether combining fecal occult blood testing and sigmoidoscopy would lower mortality or morbidity more than either test alone. In a nonrandomized, controlled study involving more than 12,000 first-time attendees at a preventive-health clinic screened using rigid sigmoidoscopy, the addition of fecal occult blood testing detected more cancers on initial screening than sigmoidoscopy alone, but mortality after 9 years was not significantly lower (0.36 per 1,000 patient-years in patients receiving both tests versus 0.63 per 1,000 patient yeas in controls; p = 0.11). Whether results are generalizable to flexible sigmoidoscopy is uncertain. • Double Contrast Barium Enema. No trial has examined the ability of screening barium enema to reduce the incidence or mortality from colorectal cancer. • Colonoscopy. The effectiveness of colonoscopy to prevent colorectal cancer or mortality has not been tested in a randomized clinical trial. The National Polyp Study, a randomized trial of different intervals of surveillance after polypectomy, estimated that 76% to 90% of cancers could be prevented by regular colonoscopic surveillance exams. These results should be interpreted with caution, however, because they are based on historical controls, and trial participants had more complete polyp removal than may occur in the screening setting. A single case-control study suggests that colonoscopy is associated with lower incidence of colon cancer (odds ratio = 0.47; 95% CI, 0.37-0.58) and lower mortality from colorectal cancer (odds ratio = 0.43; 95% CI, 0.30-0.63). Slightly greater benefits of colonoscopy have been predicted in models that project benefits based on sensitivity of screening and rates of polyp progression. • Computed tomography colography. No studies have evaluated the effectiveness of computed tomography colography in reducing morbidity or mortality from colorectal cancer.
Harms of Screening	
ACS	Limitations of !nSure™ Fecal Occult Blood Test (FOBT)

(2003)	Disadvantages of an immunochemical FOBT compared with a guaiac test include: • Limited clinical testing. !nSure™ FOBT has not been tested in a large screening population of average-risk individuals, although trials are underway in Queensland, Australia, and Chicago, Illinois, with additional studies being planned. • Sensitivity limitations. While immunochemical tests have advantages over guaiac tests, they are still tests for occult blood, which may leak intermittently and may occur from sources in the colon or rectum other than cancers or large adenomas. Data indicate that the problem for detection created by intermittency is less marked with immunochemical than with guaiac tests because higher test sensitivity is not accompanied by significant degradation of specificity, as is the case with guaiac-based tests. In addition, because bleeding from adenomas occurs infrequently, the potential for CRC prevention through adenoma detection and removal is likely to be lower with this and all FOBT methods than with endoscopic and imaging screening modalities. However, when used annually, as recommended, the program sensitivity of FOBT is very high.
AGA / ASGE / ACP / ACG (2003)	• Currently available tests for fecal occult blood fail to detect many polyps and some cancers. Also, most people who test positive will not have colorectal neoplasia (have a false positive test result) and thus will undergo the discomfort, cost, and risk of colonoscopy without benefit. • Colonoscopy involves greater cost, risk, and inconvenience to the patient than other screening tests, and not all examinations visualize the entire colon. • Genetic testing can have psychological effects and subject persons with positive tests to the risks of discrimination. Therefore, it should only be performed after genetic counseling of patients and parents of children.
CTFPHC (2001)	• A sequelae of false-positive or false-negative results from fecal occult blood tests (e.g., unnecessary investigations and false reassurance) • Perforation (sigmoidoscopy 1.4 per 10,000 procedures; colonoscopy 10 per 10,000 procedures)

	• Bleeding • Anxiety and poor compliance
FMS (2005) Updated	Harmful effects of screening include: • The physical complications of colonoscopy (perforation or haemorrhage) • Disruption to lifestyle • Stress and discomfort of testing and investigations • The anxiety caused by false positive screening tests • False negative tests. Because the sensitivity and specificity of faecal occult blood are rather poor, a negative result does not exclude colorectal cancer in a symptomatic patient.
UMHS (2004) New	No harmful effects discussed
USPSTF (2002)	Fecal occult blood test has few potential harms but false-positive tests can lead to invasive procedures such as colonoscopy. Sigmoidoscopy can, in rare instances, lead to bowel perforation (1 to 2 per 10,000 examinations). In a study of 1,235 screening sigmoidoscopies, adverse effects included pain (14%), anxiety, bleeding (3%), gas or flatus (25%), but no perforations. One patient died from complications after surgery to remove a severely dysplastic adenoma. A survey of barium enema experience reported that important complications of any type occurred in 1 in 10,000 examinations; perforation occurred in 1 in 25,000 examinations; death in 1 in 55,000 examinations. Screening colonoscopy poses higher risks than fecal occult blood test or sigmoidoscopy, both because it is a more invasive procedure and because generally it is used with conscious sedation, which may lead to complications. The risks of colonoscopy depend on whether it is used simply for screening and diagnosis, or whether it is also used for therapeutic procedures (e.g., removal of polyps). In two studies of screening colonoscopies in more than 5,000 patients, 0.2% to 0.3% had major complications during or immediately after the procedures, the most common being bleeding requiring hospitalization or emergency care. Risks are higher in therapeutic procedures (e.g., when

	polypectomy is performed) than in diagnostic or screening procedures. Rates of perforation for diagnostic procedures in 16 published studies ranged from 0.03% to 0.61%. There are few data on bleeding complications but one study reported no bleeding events in 250 patients. The complication rates for therapeutic procedures were higher in some studies: 0.07% to 0.72% for perforations and 0.2% to 2.67% for bleeding. Death was rare (between 1 in 16,000 to 1 in 27,000) and more likely in symptomatic patients with acute problems or those with comorbid conditions. The mortality rate as a result of screening is likely to be on the lower end of this range. Complication rates could increase, however, if widespread adoption of colonoscopy leads to more procedures by less skilled endoscopists. Data are lacking on complications of computed tomography colography. Patient Preferences and Adherence Some patients report that they find the fecal occult blood test unpleasant or difficult to perform, but 50% to 70% of patients will complete fecal occult blood test when advised to by a clinician. A reminder system can increase adherence rates by an average of 14%. Studies conducted in primary care settings have found rates of adherence for sigmoidoscopy to be 25% to 50% for the initial test, but there are no data on adherence to repeat examinations. When given information about screening options and offered the choice of fecal occult blood test alone, sigmoidoscopy alone, or both tests together, most patients in an academic internal medicine clinic preferred both tests or fecal occult blood test alone; only 8% to 13% preferred sigmoidoscopy alone. However, patient adherence to combined testing is lower than it is for sigmoidoscopy or fecal occult blood test alone. Patients' acceptance of barium enema screening has not been evaluated. Studies examining the relative discomfort of barium enema and colonoscopy have produced inconsistent results. In one study of patients in a population with considerable previous screening experience, 38% preferred colonoscopy to other methods. The acceptability and feasibility of computed tomography colography have not been examined.

TABLE 5: EVIDENCE AND RECOMMENDATION RATING SCHEMES; REFERENCES SUPPORTING THE RECOMMENDATIONS	
Rating Scheme	
CTFPHC (2001)	Level of Evidence I - Evidence from at least 1 properly randomized controlled trial (RCT). II-1 - Evidence from well-designed controlled trials without randomization. II-2 - Evidence from well-designed cohort or case-control analytic studies, preferably from more than 1 centre or research group. II-3 - Evidence from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments could also be included here. III - Opinions of respected authorities, based on clinical experience, descriptive studies or reports of expert committees. Recommendation Grade A. Good evidence to support the recommendation that the condition or maneuver be specifically considered in a periodic health examination (PHE). B. Fair evidence to support the recommendation that the condition or maneuver be specifically considered in a periodic health examination. C. Insufficient evidence regarding inclusion or exclusion of the condition or maneuver in a periodic health examination, but recommendations may be made on other grounds. D. Fair evidence to support the recommendation that the condition or maneuver be specifically excluded from consideration in a periodic health examination. E. Good evidence to support the recommendation that the condition or maneuver be specifically excluded from a periodic health examination.
FMS (2005) Updated	Levels of Evidence A. Strong research-based evidence. Several relevant, high-quality scientific studies with homogeneous results. B. Moderate research-based evidence. At least one relevant, high-quality study or multiple adequate studies. C. Limited research-based evidence. At least one adequate scientific study.

	D. No scientific evidence. Expert panel evaluation of other information. References Supporting the Recommendations • The database of abstracts of reviews of effectiveness (University of York), DARE-971223. In: Cochrane Library [database online]. Issue 4. Oxford: Update Software; 1999 • Towler BP, Irwig L, Glasziou P, Weller D, Kewenter J. Screening for colorectal cancer using the faecal occult blood test, Hemoccult [CD001216]. In: Cochrane Database of Systematic Reviews, Cochrane Library [database online]. Issue 2. Oxford: Update Software; 2002 • Vernon SW. Participation in colorectal cancer screening: a review. J Natl Cancer Inst 1997 Oct 1;89(19):1406-22. [214 references]
UMHS (2004) New	Levels of evidence reflect the best available literature in support of an intervention or test: A. Randomized controlled trials B. Controlled trials, no randomization C. Observational trials D. Opinion of expert panel References Supporting the Recommendations American Gastroenterological Association, American Society for Gastrointestinal Endoscopy, American College of Physicians, American College of Gastroenterology (AGA/ASGE/ACP/ACG). Colorectal cancer screening and surveillance: clinical guidelines and rationale-update based on new evidence. Gastroenterology 2003 Feb;124(2):544-60.
USPSTF (2002)	The U.S. Preventive Services Task Force (USPSTF) grades the quality of the overall evidence on a 3-point scale (good, fair, or poor). Good Evidence includes consistent results from well-designed, well-conducted studies in representative populations that directly assess effects on health outcomes. Fair Evidence is sufficient to determine effects on health outcomes, but the strength of the evidence is limited by the number, quality, or consistency of the individual studies; generalizability to routine practice; or indirect nature of evidence on health outcomes. Poor Evidence is insufficient to assess the effects on health outcomes because of limited number of power of studies, important flaws in their

	design or conduct, gaps in the chain of evidence, or lack of information on important health outcomes. The USPSTF grades its recommendations according to one of five classifications (A, B, C, D, or I), reflecting the strength of evidence and magnitude of net benefit (benefits minus harms). A The USPSTF strongly recommends that clinicians routinely provide [the service] to eligible patients. (The USPSTF found good evidence that [the service] improves important health outcomes and concludes that benefits substantially outweigh harms.) B The USPSTF recommends that clinicians routinely provide [the service] to eligible patients. (The USPSTF found at least fair evidence that [the service] improves health outcomes and concludes that benefits outweigh harms.) C The USPSTF makes no recommendation for or against routine provision of [the service]. (The USPSTF found at least fair evidence that [the service] can improve health outcomes but concludes that the balance of benefits and harms it too close to justify a general recommendation.) D The USPSTF recommends against routinely providing [the service] to asymptomatic patients. (The USPSTF found at least fair evidence that [the service] is ineffective or that harms outweigh benefits.) I The USPSTF concludes that the evidence is insufficient to recommend for or against routinely providing [the service]. (Evidence that [the service] is effective is lacking, of poor quality, or conflicting and the balance of benefits and harms cannot be determined.)

GUIDELINE CONTENT COMPARISON

The American Cancer Society (ACS), the American Gastroenterological Association in collaboration with the American Society for Gastrointestinal Endoscopy, American College of Physicians, and American College of Gastroenterology (AGA/ASGE/ACP/ACG), the Canadian Task Force on Preventive Health Care (CTFPHC), the Finnish Medical Society Duodecim (FMS), the University of Michigan Health System (UMHS), and the U.S. Preventive Services Task Force (USPSTF) present recommendations for CRC screening in people at average risk (asymptomatic, age $\geq$50 years, no other risk factors) and provide explicit reasoning behind their judgments. Also, ACS, AGA/ASGE/ACP/ACG, CTFPHC, and

FMS present recommendations for asymptomatic adults with some degree of increased risk of developing CRC. USPSTF and UMHS refer to expert guidelines from medical specialty organizations (AGA/ASGE/ACP/ACG, for example) for individuals at risk.

Areas of Agreement

Screening Adults of Average Risk

All guideline developer organizations represented in this synthesis recommend screening for colorectal cancer in average risk, asymptomatic adults. The five guideline developers located in North America, ACS, AGA/ASGE/ACP/ACG, CTFPHC, UMHS ,and USPSTF provide an age at which screening should begin (≥50 years); FMS does not designate a starting age. The five guideline developers located in North America also recommend screening, utilizing one of several acceptable screening tests such as fecal occult blood testing (FOBT) or flexible sigmoidoscopy. These five groups present two or more acceptable screening options and do not explicitly recommend one screening test over another citing a lack of solid evidence to do so. FMS only considers FOBT for population-based screening in its recommendations (although it makes no clear recommendations for it); In discussing the rationale for FOBT, UMHS acknowledges that clear evidence for reduced CRC mortality exists with a mass FOBT screening program, but further notes that this screening modality has come under criticism due to its low sensitivity and specificity, low patient compliance, and the possibility that it does little more than randomly assign subjects to receive colonoscopy.

Choosing a Screening Intervention for Adults of Average Risk

The three guideline developer organizations presenting recommendations for how to choose a screening test, AGA/ASGE/ACP/ACG, UMHS, and USPSTF, agree that patients should be involved, to some degree, in selecting a screening intervention. Each of these three organizations agrees the advantages and disadvantages of the various screening options should be shared with the patient. AGA/ASGE/ACP/ACG recommends candidates should then have the opportunity to select how they will be screened. USPSTF and UMHS state what should be considered when making the choice, one item being patient preference.

Acceptable Screening Interventions for Adults of Average Risk

DRE

All guideline developer organizations represented in this synthesis directly or indirectly acknowledge that the DRE is not an acceptable screening intervention.

FOBT, Sigmoidoscopy, FOBT + Sigmoidoscopy, Colonoscopy, Barium Enema

Four guideline developer organizations, ACS, AGA/ASGE/ACP/ACG, UMHS, and USPSTF recognize FOBT, sigmoidoscopy, combination of FOBT and sigmoidoscopy, and colonoscopy as acceptable screening interventions for use in asymptomatic adults of average risk. These organizations acknowledge that the option of total colon examination (TCE) by colonoscopy or barium enema has not been supported

by randomized controlled trials and that support for its use comes from indirect evidence of benefit and efficacy. UMHS notes that air or double-contrast barium enema is an acceptable modality, but does not recommend it. CTFPHC did not consider screening with barium enema because of the lack of direct evidence. FMS only considered FOBT for screening asymptomatic adults of average risk (and colonoscopy for screening asymptomatic adults at increased risk). All organizations recognize that a positive FOBT result requires diagnostic follow-up.

Acceptable Screening Interventions for Adults of Increased Risk

Surveillance with Colonoscopy

There is general agreement among the guideline developers who provide screening recommendations for individuals at risk for developing CRC that colonoscopy is the most appropriate screening intervention for people with a history of adenomatous polyps, CRC, or inflammatory bowel disease.

Genetic Counseling and Genetic Testing

ACS, AGA/ASGE/ACP/ACG, and USPSTF recommend genetic counseling followed by genetic testing for individuals with FAP and HNPCC. CTFPHC recommends genetic counseling followed by genetic testing for FAP and does not make recommendations for genetic counseling or genetic testing for HNPCC. Genetic counseling and genetic testing are not interventions considered by FMS or UMHS.

Areas of Differences

Acceptable Screening Interventions for Adults of Average Risk

FOBT: Rehydration of Cards, Dietary Restrictions, Newer Technology

There are several differences regarding the recommended procedure for FOBT. ACS, AGA/ASGE/ACP/ACG, CTFPHC, FMS, and USPSTF recommend use of screening cards. AGA/ASGE/ACP/ACG strongly recommends against rehydration of the cards. AGA/ASGE/ACP/ACG notes that although rehydration increases sensitivity, it results in increased false-positive rates. USPSTF acknowledges these two effects of rehydration on test results but does not specifically recommend against it. UMHS does not discuss the recommended procedure for FOBT but recognizes that FOBT screening protocols vary.

AGA/ASGE/ACP/ACG recommends use of dietary restrictions when the newer, more sensitive, guaiac-based FOBTs are used but not when the new immunochemical FOBTs are performed. CTFPHC recommends the use of dietary restrictions prior to screening but adds a comment that a recent meta-analysis of 4 trials found no improvement in positivity rates or change in compliance rates. AGA/ASGE/ACP/ACG cited a systematic review of 3 trials showing the same outcomes as the 4 trials reviewed by CTFPHC noting that the older, less sensitive guaiac-based tests were used in the trials. AGA/ASGE/ACP/ACG further notes that dietary restriction does affect the performance of the more sensitive guaiac-based FOBTs recently introduced into clinical practice. USPSTF states the value of dietary

restrictions is not established. Dietary restrictions in relationship to FOBTs are not discussed by UMHS and FMS.

ACS and AGA/ASGE/ACP/ACG are the only two guideline developers to specifically recommend use of immunochemical FOBTs in practice.

DCBE and Colonoscopy -- Screening Frequency

Differences are also noted in recommendations for screening frequency for double-contrast barium enema (DCBE) and colonoscopy. ACS and AGA/ASGE/ACP/ACG recommend DCBE every 5 years. CTFPHC and USPSTF cite the lack of evidence to make a recommendation regarding screening intervals. UMHS refers to the AGA/ASGE/ACPA/ACG recommendation for DCBE screening every 5 years, but does not recommend, only stating the need for more observational studies of barium enema in literature.

ACS and AGA/ASGE/ACP/ACG recommend colonoscopy every 10 years, and CTFPHC and USPSTF don't offer recommendations for screening interval stating there is insufficient evidence to recommend for or against routine screening with colonoscopy. UMHS refers to the to the AGA/ASGE/ACPA/ACG recommendation for colonoscopy screening every 10 years, but suggests that studies are limited.

Acceptable Screening Interventions for Adults at Increased Risk

Screening recommendations for people with a family history of CRC vary among guidelines. ACS, AGA/ASGE/ACP/ACG, UMHS, and USPSTF recommend increased surveillance or earlier screening for these individuals. In contrast, CTFPHC recommends that people with a family history of CRC or polyps undergo the same screening as average risk individuals, stating insufficient evidence to recommend colonoscopy for these individuals, unless the criteria for hereditary non-polyposis colon cancer is met. Although CTFPHC acknowledges that there is evidence of an increased prevalence of neoplasms in these individuals, there is insufficient information to recommend more intense screening than that of individuals at average risk. FMS recommends colonoscopy for persons with marked familial susceptibility but does not state the age at which to begin or how frequently.

This Synthesis was prepared by ECRI on June 7, 1998; and revised on April 18, 2000. It was reviewed by the guideline developers as of June 12, 2000. Updated recommendations issued by the American Cancer Society (ACS) were incorporated into this synthesis by ECRI on April 20, 2001 and were reviewed by the guideline developer as of August 28, 2001. CTFPHC recommendations were added to this synthesis by ECRI on October 10, 2001 and reviewed by the developer as of November 2, 2001. This Synthesis was updated again on January 08, 2004 to incorporate updated AGA/ASGE/ACP/ACG and USPSTF recommendations. It was updated again on January 21, 2004 to incorporate updated guidelines from ACS, and to add the FMS guideline. This Synthesis was most recently updated on September 2, 2005 to include the UMHS guideline and to update the FMS guideline. The updated information was reviewed by UMHS on November 3, 2005.

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